Planning New Towns for Industry

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The planner's dream of a brave new world—including new towns for industry—has at last become a reality. It is common knowledge that the tremendous demands made on this country by World War II and the continued post-war boom in industrial expansion, have had far reaching effects on our economy. Among the effects of this industrial expansion have been the near exhaustion of high grade iron ore of the Mesabi Range, and the increased demand for copper ore. Both these raw materials are available from foreign sources, but recently it became the national policy to stimulate domestic reserve production in case the flow from foreign territories is interrupted in a war emergency. This policy has led to the development of three new industrial towns in Minnesota and Upper Michigan. The job of planning and designing these towns was undertaken by PACE Associates of Chicago.

Two of the towns—Babbitt and Beaver Bay, Minnesota, are concerned with the mining and processing of Taconite iron ore from the Mesabi Range. The third town—White Pine, Michigan—is concerned with the mining, milling and smelting of copper ore.

For many years research laboratories of the larger steel companies have been working on methods for using the tremendous reserve of Taconite—a low-grade iron bearing rock—in the Lake Superior region. Taconite, in its natural state, is too low in iron content to be utilized directly in a blast furnace. It is a hard rock usually of 25 to 30 per cent iron, difficult to mine and requiring heavy machinery to handle. In order to make it economical to ship and be used by the steel mills, its bulk has to be reduced by "beneficiating". Three tons of rock must be crushed and separated by a magnetic process into pellets to produce one ton of concentrated ore containing 60 to 70 per cent iron.

In 1939, the Reserve Mining Company, with Oglebay Norton and Company as agents, was incorporated in Minnesota to beneficiate Taconite ore in commercial quantities. In 1950 a 150 million dollar development program was launched to construct two new

plants and townsites. PACE Associates had the job of planning, designing and developing the new towns of Babbitt (the mine site, 15 miles south of Ely, Minnesota) and Beaver Bay (the beneficiating plant site and ore shipping port on the north shore of Lake Superior, 55 miles northeast of Duluth).

The story behind the development of the third new town—the White Pine copper mining project—is similar in many respects to Babbitt and Beaver Bay. As the need for domestic copper increased, Copper Range Company acquired and since 1937 has conducted explorations of the large low-grade ore body known to exist near the old White Pine mine in Ontonagon County, Upper Michigan. The commercial development of the mine was accelerated by a request from the War Production Board for the mining industry to develop all possible domestic sources of copper. Construction of a pilot mine began in 1947. By early 1952 an R.F.C. loan of 57 million dollars had been approved and preliminary planning surveys begun for the development of a plant and townsite to house the workers. PACE Associates undertook the planning and design of all the non-plant buildings and utilities for the project and the townsite. When the project is completed only pure copper ingots will be shipped from White Pine. The entire operation from mining ore through milling and smelting, including the housing of workers, will be handled at the $100 million dollar project.

Using these three new towns—Babbitt, Beaver Bay, and White Pine—as examples, a general picture of some of the methods and problems involved in planning new towns for industry will be presented.

PLANNING GOALS AND PLANNING ELEMENTS

First, we had to define the framework within which we were going to plan and then determine our planning goals within that framework.

This framework consisted of a complete scheme for each townsite encompassing roads, utilities, residential housing, shopping, health, religious and municipal facilities. In short, in each case we were to study and recommend the provision of all matters which would contribute to the comfort, health, and social and economic welfare of a community of two to five thousand persons.

The planned goal of a town for a specific industry is different in one major respect from planning a community for speculative development. In the latter case the goal is to build homes that sell

at a profit, while in the former, the goal is to build houses and community facilities that will sell the workers into working there.

All three towns were planned and designed to attract workmen, skilled operators and engineers into an area otherwise sparsely settled. Our sociological surveys, both in the iron range country and the copper country confirmed this planning objective by showing that adequate, economical and comfortable housing was *the* most important factor in attracting the quantity and quality of labor needed.

Second, it became immediately apparent that before any planning or design decisions could be made, certain elements of the situation had to undergo further study.

The elements we were particularly concerned with were: climate; topography; water supply; sewage disposal; electrical power; local and regional transportation; social and economic factors, especially the people who would be living and working in these towns, their particular way of life, the kinds of housing they would need, the school requirements of their children, shops, churches, health clinic, their recreation habits and needs, and so on.

In analyzing these elements, each of the three towns' areas was found to have widespread differences. For instance, Babbitt has the worst climatic conditions. Minimum temperatures over a period of years average—33° F. Winds are often extremely strong in winter while rainfall is frequent and often heavy in summer—occasionally as much as 6 inches in 24 hours. Winter sets in as early as the end of September and sometimes lasts until the end of April.

White Pine also has a severe winter, annual snowfall is close to 200 inches. Accumulated snow on the ground averages 2 to 3 feet and drifts of 8 to 10 feet have been recorded.

Beaver Bay, because of its proximity to Lake Superior, has the advantage in having a more temperate climate—cooler in summer and warmer in winter.

Differences in topography had considerable effect on the design of the townsites. Aerial photographs were used extensively in the preliminary design stage.

Babbitt is located on what was once a prized potato farm—a relatively flat and fertile area, cleared of trees, and with an excellent gravel sub-soil. The surrounding area is typical of the Minnesota iron range country, well wooded and rolling to sub-mountainous. To the south is a chain of small lakes limiting the expansion of the town in that direction. Some three miles to the southeast is the mountain range which forms part of the actual taconite ore deposit. The total townsite area extends 2¼ miles in an east to west direction.

All the land mentioned has been acquired by the Reserve Mining Company, including a considerable area in the immediate vicinity of the new town for the purpose of controlling undesirable land usage.

The topographical conditions at Beaver Bay are completely different to those at Babbitt. The townsite is located on the side of a bluff ranging in elevation from 600 to 1,200 feet above Lake Superior. Although there are areas with about 4 feet of topsoil, the greater part of the site has cover in excess of 8 feet. Grades average 4-5 per cent, with extremes running 12 per cent to 14 per cent. House types had to be designed to take advantage of these slopes. The site is well protected by a natural amphitheater running from the north to the southwest. The whole area was covered by dense second growth timber.

White Pine townsite presented different topographical problems. The relatively level site was covered with dense brush and timber, which had to be cleared. The sub-soil consists of 40 feet of glacial till and Montmorillonite clay, scattered throughout with boulders. The clay, with a high volumetric change according to moisture content, made the provision of basements for the houses impractical. The boulders also prevented the use of piling to support the heavier structures of the mine plant.

In addition to these physical elements there were social and economic factors that also had to be taken into account. For instance, the only information originally available was a figure for each townsite of the total number of mine workers the companies estimated they would need. It was still necessary to determine where the labor force might come from; how many would commute and how many would want to live at the townsite. Of those living at the town estimates had to be made on how many would be married, the number of children they would be likely to have, and their housing requirements.

Also to be determined was the new town's trade area, the amount each family spent on goods and services, and what stores would be supported by their purchasing power. School enrollment figures had to be projected for the next 15 years in order to design an efficient school system. What these people liked to do with their spare time had to be known in order to provide adequate recreational facilities. It was also necessary to determine the community's religious memberships and probable church attendance in order to provide proper church sites. The town's requirements for medical facilities had to be estimated. Suggestions had to be made on the

municipal services to be provided and how the town should be operated in order to safeguard its development.

How all these elements were determined and how the results of preliminary research were fitted into the total planning scheme will be described next.

THE PLANNING PROCEDURE: HOW THE ELEMENTS WERE DEVELOPED

Our preliminary research was accomplished by teams of engineers, sociologists and economists who conducted field surveys. Data was collected from as many pertinent sources as possible. For example, in determining population characteristics we had access to personnel records of existing mining companies in the Mesabi Range of Minnesota and the copper country of Upper Michigan. From these sources and Bureau of the Census data for 1940 and 1950, our sociologists were able to tabulate the probable age distribution, family size and ultimate population of our new towns. Our figures were modified to include our knowledge of the characteristics of development of other recent new towns, such as Greenbelt, Maryland, and Park Forest, Illinois.

It is the policy of the mining companies to hire the younger men, preferably between the age of 30 and 45, in order that the cost of training them for the increasingly skilled jobs involved in modern mining operations, can be written off over a longer period of time. Surveys indicated that approximately 85 per cent of these young men would be married and would need single family housing. The number of rooms to be provided was governed by family size and income. The U. S. Census and school records show that iron range and copper country families are larger than average for the United States. For instance our population estimates for Babbitt showed that 66 per cent of the families would need three bedrooms; 22 per cent would need two bedrooms; 10 per cent would need four bedrooms, while less than 2 per cent would need only a single bedroom house. Dormitory units were to be provided for single miners—an estimated 15 per cent of the population. Later, multiple row houses and apartment houses would be built for other single workers, school teachers and some of the shopping center service workers. At Beaver Bay, the final breakdown of dwelling unit types was: 63 per cent single family units; 25 per cent rowhouse units; 12 per cent apartment units.

Many housing design requirements for each of these towns were disclosed by field investigations. The climate and the living habits

of young iron-range and copper country families determined a number of special design features.

For example, our studies indicated only one entrance door was used, and so only one entrance door is provided in all of the houses. This is located nearest the driveway to the attached garage since the driveway is the only path that can be kept clear of snow. In that part of the country, the front door is only used in the summer by company.

The living room, especially, had to be larger than F.H.A. standards, since it will be used more by all members of the family because of the long winters.

Basements or utility rooms had to be large and well ventilated to provide ample play space for children in the winter, the drying of laundry, and for workers to clean up when returning from the mine plant.

Garages were considered essential since 99 per cent of mining families own a car, this usually being the principle means of transportation to the mine site and for the once-a-week shopping expedition.

In order to determine our elementary and high school requirements we interviewed the school principals and superintendents of each school district which would be involved by the new towns. From them we learned of the school board's own particular requirements and regulations concerning classroom types, size and other facilities. However, we had to determine for ourselves the number of classrooms that would be needed. To do this we projected the birthrates of a number of typical mining communities in each of the new town areas from 1933 to 1970.

We noted the trends in each mining community and then constructed a school enrollment schedule based on births per 100 families for each year up to 1970 for each townsite. This schedule took into account the percentage of student drop-outs that normally occur in that part of the country between elementary school and high school, and high school and junior college.

Our shopping center requirements for each town were more difficult to estimate. By interviewing store owners in each trade area and by using the total annual retail sales figures provided by the 1948 Census of Business for each nearby community, we determined how much a miner or a typical mining family would spend a year for each major commodity or service, such as groceries, clothing, or car servicing. From these figures, after accounting for trade lost and gained from other communities, we were able to estimate the total potential annual sales for each of our towns. Knowing these

figures we worked backwards and determined the number and types of stores which could be profitably supported by this purchasing power. Only those stores were included which provided the owner with at least $5,000 a year income.

All three shopping centers were designed to be built in stages. The first stage in each case generally included 7 stores, a bank, post office and 3 to 4 utility offices to serve an initial population of 450 families or 2,100 persons. The stores included a supermarket, service grocery and bakery, drug store and packaged liquor, a department store, shoe repair, barber shop, laundry and cleaning agency.

All shopping centers were designed for future expansion. New store space to serve an increasing population will be provided by the addition of bays. The Babbitt and White Pine centers will only serve their own communities but the Beaver Bay center is expected to become the largest shopping area on the lake shore north of Duluth.

Part of each shopping center was planned to serve as a commercial recreation center open to the community in the evenings. This section provided a soda-fountain and restaurant, a tavern, and a bowling alley.

At White Pine, movie shows, community dancing and swimming pool facilities were designed to be provided at the high school, in keeping with the Michigan State Board of Education's policy to promote the use of school facilities for adult education and recreation.

The street pattern for each townsite varies according to the topographic limitations. The level site at Babbitt made it possible to develop an ideal street system of loops connecting directly with wide collector streets leading to the central shopping area. The objective was to provide greater safety for pedestrians, more privacy for residents, and more area for recreation. Footpaths make it possible for children to reach school without crossing more than one collector street.

At Beaver Bay the steep grades required the street pattern to follow the contours. This street system proved to be more economical to build than the loop system at Babbitt. With only a few exceptions, street grades at Beaver Bay do not exceed 6 per cent.

The White Pine townsite is located on a gently rolling slope to the north, bounded on the east and west by steep ravines. The curving street pattern was designed to make the most use of the awkward shaped site.

At all three townsites house plans were oriented to provide southern exposures for the principle rooms. At Beaver Bay houses have the additional feature of a view of Lake Superior.

The severe climate had to be taken into consideration in planning the town centers, (areas of approximately 30 acres). Buildings were centrally located in the town plan and grouped to minimize the uncovered distance between them. Dual purpose parking was carefully planned to serve the shopping center at peak hours and also provide extra parking space for High School basketball games. Enough strips of vacant land were left so that there would be room to pile snow after plowing the parking lot.

Buildings which were located at the town centers included: stores designed on the principle of the arcade, grouped under one roof and completely enclosed from the weather; a service station; garage and automobile dealer's showroom; a municipal building housing a police and fire station, city manager's and engineer's office. All townsites have separate storm and sanitary sewer systems.

The sewerage systems of all three towns are designed for 1,500 dwelling units with an average of 4.35 persons per unit, plus commercial requirements. All sewage treatment plants were designed in accordance with recently adopted standards of the joint committee of "Upper Mississippi River Board of Public Health Engineers and Great Lakes Board of Public Health Engineers"—a group composed of ten states of which Indiana is a member. All treatment plants are planned for stage development. Initially, the plants will provide partial treatment. Ultimately, they will give complete treatment, using trickling, high-rate filters with recirculated flow. In addition, each plant will have a primary and secondary clarifier, sludge digestion tank station pumphouse and sludge beds.

The choice of water systems for the three townsites was determined by the source of supply and topography. All systems are designed for a per capita consumption of 100 gallons per day, plus allowance for maximum flow for fire protection based upon the application of the Hardy Cross system of balancing flows. The systems in all three towns received the best Fire Underwriters rating possible for a town having a volunteer fire department.

Babbitt will get its water from a 42-inch diameter gravel-packed deep well, tested for a pumpage of 730 gallons per minute at a 17 foot drawdown for a 36 hour duration. A 150,000 gallon overhead storage tank will maintain a faucet pressure of 35 psi.

The water treatment plant at White Pine is unusual in its application to a municipal system. The combination of the exceptional low turbidity of Lake Superior water and the use of the existing process water elevated tank with a static head of 130 feet made it possible to use diatomic type pressure filters, with no pump-

ing required. A relatively turbid water pumped through this system which would require a great amount of backwashing would have been prohibitive costwise. The application of this type of equipment is usually reserved for swimming pools.

The Beaver Bay water treatment and distribution system incorporates features which only would be found if several systems were taken together. Water is drawn from Lake Superior by low-lift pumps. The water is filtered and chlorinated at a water treatment plant set back some distance from the shore because of the severe ice conditions. High-lift pumps at the treatment plant raise the water 600 feet to a storage tank at the highest point in the town.

The water distribution system consists of successive pressure zones and pressure reducing valves which maintain a service pressure of 35 to 85 pounds in each zone. Pressure relief valves were installed to prevent excessive line pressure developed by surges in the event power failure stopped the pumps.

Electrical power is supplied by the Minnesota Power and Light Co. at Babbitt; while at Beaver Bay PACE Associates installed diesel operated generators for the initial construction and development phases. White Pine has an interchange arrangement with the Upper Peninsula Power Company, whereby it buys power when needed, or sells it to the power company if White Pine has a surplus from its own generating plant. This plant consists of three Westinghouse 15,000 kw turbines, two of which run off their own boilers, while the third is tied to the smelter's waste-heat boiler.